

# Operating Experience Weekly Summary 97-51

*December 12 through December 18, 1997*

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## **EVENTS**

### **1. PERSONNEL CONTAMINATION – ASSUMED RISK FOR CERTAIN RADIOLOGICAL WORK ACTIVITIES**

On December 9, 1997, at the Oak Ridge Y-12 Site, a welder detected contamination on the top of his company-issued high-top shoes as he attempted to exit a radiological buffer area. The worker had been kneeling on the floor to complete an electric arc welding job. A radiological control technician confirmed alpha contamination of 6,400 dpm/100 cm<sup>2</sup> on the ankle area of both shoes. Beta/gamma contamination was less than 3,000 dpm/100 cm<sup>2</sup>. The welder was in compliance with the radiological work permit requirements for this activity. Recently, radiological control administrators reassessed protective clothing requirements following a welder fatality at the East Tennessee Technology Park (K-25 Site). They determined that welding, burning, and hot work activities should not require workers to wear plastic booties over company-issued work shoes. They also determined that taping of closures was not required. However, fire-retardant anti-contamination clothing and high-top leather footwear with a rubber, low-top shoe covers were required for this type work. Facility personnel believed the radiological work permit for this activity was sufficient to protect the welder from radiological hazards, but not so restrictive as to introduce unnecessary physiological or safety hazards. (ORPS Report ORO--LMES-Y12NUCLEAR-1997-0051)

Site radiological control administrators determined that inherent health and safety risk concerns associated with certain radiological work activities outweighed the relative health hazard(s) associated with low-level alpha contamination. They declared that personnel contamination of this nature was an assumed risk. The DOE Y-12 Site radiological control manager concurred with their position and recommended that similar personnel radiological contamination issues be documented in a specific quarterly roll-up occurrence report in accordance with the provisions contained in DOE O 232.1, *Occurrence Reporting and Processing of Operations Information*. Site radiological control administrators believe the consideration of all hazards is consistent with DOE P 450.4, *Safety Management Policy*.

NFS reported the following events where anti-contamination clothing caught fire in the Weekly Summary.

- Weekly Summary 97-17 reported that a radiological control technician at Hanford caught his anti-contamination coveralls on fire when he stepped too close to a space heater. The technician was in a temporary tent performing radiological surveys on trucks leaving a contamination area. Another worker noticed the flames and alerted the technician. The technician extinguished the flames by patting them with his glove and was not burned. (ORPS Report RL--BHI-REMACT-1997-0004)
- Weekly Summary 97-08 reported that a welder at the Oak Ridge K-25 Site was fatally injured when his anti-contamination clothing and coveralls caught fire. The welder was using a cutting torch in a contaminated cell area and was wearing multiple layers of protective clothing, a respirator, and a welder's mask. (ORPS Report ORO--LMES-K25GENLAN-1997-0001)

DOE appointed a Type A Accident Investigation Board to investigate the welder fatality. Board members found that concerns regarding the contamination hazard may have caused the use of a level of protective equipment that impeded the welder's response to the actual, but unrecognized, hazard of clothing ignition. Board members determined a contributing cause was that the equipment used to protect the welder from radiological hazards created an additional fire hazard by limiting the welder's ability to see, smell, or feel the ignition of his clothing and by interfering with his ability to call for help. (*Type A Accident Investigation Board report on the February 13, 1997, Welding/Cutting Fatality at the K33 Building, K-25 Site Oak Ridge, Tennessee*)

Radiological control managers and facility managers should assess the level of personal protective equipment and clothing necessary for radiological work activities that include other hazards that could affect worker safety. Workers should not be encumbered with personal protective equipment that could place them at risk of serious injury from hazards other than radiological. The choice of personal protective equipment can affect a worker's (1) "stay-time" in radiation areas, (2) ease of emergency egress, and (3) ability to safely perform assigned tasks. Assessment of personnel contamination risk should also apply to activities that may involve heat stress and facility emergencies. Personnel injury and life-threatening situations always have priority over radiological considerations.

DOE/EH-0256T, rev 1, *Radiological Control Manual*, Appendix 2A, provides guidelines and exposure limits for emergency exposures for life-saving activities. The manual also provides guidance for personal protective equipment and clothing.

- Article 325, "Personal Protective Equipment and Clothing," cautions that the use of personal protective equipment or clothing (including respiratory protection) beyond that authorized by the radiological control organization detracts from work performance and is contrary to as low as reasonably achievable principles and waste minimization practices. Such use should not be authorized.
- Article 533, "Use of Respiratory Protection," requires personnel to be trained to remove their respirators to avoid life-threatening situations when exiting an area after respirator failure.
- Article 534, "Heat Stress," states that heat stress may result from working in areas of high heat, humidity and radiant heat; working in protective clothing; and using respirators, particularly where other protective equipment is required. Heat stress has occurred at ambient temperatures less than 70 degrees Fahrenheit when multiple sets of anti-contamination clothing or plastic suits were in use or strenuous work was required.
- Article 656, "Emergency Response Personnel," requires personnel to be trained to understand that life-saving has a priority over radiological controls.
- Appendix 3C, "Contamination Control Practices," states that protective clothing, as prescribed in the radiological work permit, should be selected based on the contamination level in the work area, the anticipated work activity, worker health considerations, and regard for non-radiological hazards that may be present.

DOE O 440.1, *Worker Protection Management for DOE Federal and Contractor Employees*, states that the contractor must identify workplace hazards and evaluate the risk of associated worker injury or illness. When a hazard is identified, managers must assess the process and take appropriate steps to prevent, abate, or mitigate the hazard.

**KEYWORDS:** contamination, personal protective equipment, welding, radiation protection

**FUNCTIONAL AREAS:** Radiation Protection, Fire Protection

## **2. NRC PROPOSES \$2.1 MILLION FINE FOR VIOLATIONS AT A COMMERCIAL NUCLEAR UTILITY**

On December 10, 1997, the Nuclear Regulatory Commission (NRC) staff issued a Notice of Violation and proposed \$2.1 million in fines against a commercial nuclear utility for numerous violations of NRC requirements. NRC staff personnel categorized many of the violations into two general areas: (1) long-standing deficiencies in engineering programs and practices; and (2) failure to have effective programs and practices to correct problems once they were found. The NRC also found a number of violations of plant operating license technical specifications and several failures to assure that the plants were operated in accordance with design requirements contained in the final safety analysis report. This is the largest civil penalty ever proposed by the NRC. The Price-Anderson Amendments Act of 1988 subjects most DOE contractors covered by the DOE Price-Anderson indemnification system, as well as their subcontractors and suppliers, to civil penalties for violations of applicable DOE nuclear safety rules. (NRC Press Release 97-180)

In a letter to the utility, the NRC Executive Director for Operations said that while the violations did not result in actual consequences to public safety, many of them were long-standing. He also stated that they were indicative of a deficient safety culture, fostered by plant and corporate management that did not set high standards or actively encourage workers to identify and report safety issues or act upon them when they were reported. NRC inspectors, regional staff members, and members of a special team of headquarters staff identified the violations during inspections conducted at the utility between October 1995 and December 1996.

Following are examples, including the civil penalty proposed by the NRC, for each type of violation. The utility has 30 days to pay the civil penalty or to appeal.

- **Inadequate Engineering Violations (\$500,000)**—Included were 14 violations for failure to establish adequate design measures, failure to verify the adequacy of the design, and failure to translate the design features into work instructions. These violations affected a spent fuel pool cooling system, a service water system, and a backup feedwater pump. Also included were violations for inadequate or missing safety evaluations, failure to update the final safety analysis report, and numerous instances of changes being made in plant systems without performing a safety evaluation. On many occasions these violations put the plant at variance with the final safety analysis report, including 17 violations that affected nuclear safety-related components. These

components included standby diesel generators, safety-related electrical cables, and a hydrogen monitoring system that would be used in case of a severe accident.

- **Corrective Action Violations (\$1 Million)**—Included were 17 violations for failure to assure that significant nuclear safety-related problems were promptly identified and corrected, failure to determine their causes, and failure to prevent their recurrence. These violations affected conditions ranging from the amount of reactor cooling water in storage tanks to the reliability of coolers for a vital electrical switchgear room in case of an earthquake. Also included was one violation concerning a letter the utility sent the NRC that contained inaccurate information about whether the company had analyzed the root cause of deteriorating material conditions at a radioactive waste facility.
- **Technical Specification Violations (\$500,000)**—Included were violations of eight technical specifications, some on multiple occasions. Systems rendered either inoperable or unreliable by these conditions included a gas turbine generator that provided backup emergency electrical power, emergency core cooling systems, and a steam-driven auxiliary feedwater pump.
- **Quality Assurance Violations (\$100,000)**—Included were violations of five quality assurance requirements, some on multiple occasions, affecting components ranging from feedwater pump bearings to shutdown cooling piping cross-connected with the spent fuel pool cooling system.

NFS has reported Price-Anderson Amendments Act enforcement actions by the DOE Office of Enforcement and Investigation in numerous Weekly Summaries. Following are some examples.

- Weekly Summary 97-41 reported that the DOE issued a Preliminary Notice of Violation to Lockheed Martin Idaho Technologies Company at the Idaho National Engineering and Environmental Laboratory. Investigators from the DOE Office of Enforcement and Investigation were concerned about events that occurred at five nuclear facilities between February 24 and April 8, 1997. Investigators determined that the events were not isolated incidents and that they resulted in six different occasions when operational safety requirements and technical specification requirements were not met. (NTS-ID-LITC-ATR-1997-001 and NTS-ID-LITC-PBF-1997-0001)
- Weekly Summary 96-43 reported that the DOE issued two Preliminary Notices of Violations and two proposed civil penalties of \$37,500 each to Kaiser-Hill Company, the integrating contractor at the Rocky Flats Environmental Technology Site, and the Safe Sites of Colorado Company, a subcontractor to Kaiser-Hill. DOE took the action because of radiological work control deficiencies associated with two incidents that occurred between March 4 and April 8, 1996. DOE cited the integrating contractor because it has overall responsibility for the radiation protection program. The subcontractor was cited because it is responsible for implementation of the program. (ORPS Reports RFO--KHLL-SOLIDWASTE-1996-0022 and RFO--KHLL-771OPS-1996-0063)

- Weekly Summary 96-30 reported that the DOE issued a Preliminary Notice of Violation and a proposed civil penalty of \$37,500 to the Westinghouse Hanford Company (WHC) for violations of nuclear safety rules. DOE took the action because of a February 13, 1996, incident where a Hanford Tank Farms pipefitter received a radiation dose of 13 rem to his hands. In a letter to WHC, DOE stated that WHC had not properly anticipated or planned for radiological conditions and hazards. The letter also stated that DOE believed that WHC had a programmatic problem with respect to control of radiological work and that its corrective actions were not sufficient to prevent recurrence. (ORPS Report RL--WHC-TANKFARM-1996-0017)

NFS reported in Weekly Summary 97-50 that the Department of Labor (DOL) recently rendered a decision finding that WHC took retaliatory action against a former employee for raising safety concerns. Several of the safety concerns involved nuclear safety-related matters. The former employee and a co-worker had testified before a U. S. House of Representatives subcommittee at the request of the subcommittee. According to the DOL, WHC retaliated against the employee for assisting the congressional subcommittee. The case demonstrates the types of issues for which the DOE can now undertake enforcement action (Notice of Violation and civil penalties) against its indemnified contractors, subcontractors, and their suppliers under the provisions of the Price-Anderson Amendments Act of 1988. Specifically, 10 CFR Part 708, *DOE Contractor Employee Protection Rule*, provides protection from retaliation and discrimination to employees who raise concerns, including nuclear safety-related concerns. This rule has been designated as a nuclear safety rule subject to enforcement actions under 10 CFR Part 820, *Procedural Rules for DOE Nuclear Activities*.

Information about the DOE Enforcement Program policy, copies of applicable rules, a listing of enforcement actions taken, and links to related information can be found on the DOE Office of Enforcement and Investigation Home Page at URL <http://tis-nt.eh.doe.gov/enforce>.

The following DOE handbooks and standards also provide information and guidance to DOE and contractor personnel. Copies are available through the Office of Enforcement and Investigation Home Page. Copies of the handbooks and standards are also available on the DOE Technical Standards Home Page located at URL <http://www.doe.gov/html/techstds/standard/standard.html>.

- DOE-HDBK-1085-95, *DOE Enforcement Program Roles and Responsibilities*
- DOE-HDBK-1087-95, *Enforcement Handbook, Enforcement of DOE Nuclear Safety Requirements*
- DOE-HDBK-1089-95, *Guidance for Identifying, Reporting and Tracking Nuclear Safety Noncompliances*
- DOE-STD-1082-94, *Preparation, Review, and Approval of Implementation Plans for Nuclear Safety Requirements*
- DOE-STD-1083-95, *Requesting and Granting Exemptions to Nuclear Safety Rules*

The December 10 action by the NRC illustrates a new order of magnitude for civil penalties proposed by the agency. The action also clearly indicates the seriousness with which it views safety, regulatory, and employee-concern problems at the utility. Nearly 50 percent of the proposed penalty was for "corrective action" violations, which underscores the importance of promptly identifying and correcting and determining causes to prevent recurrence of significant problems. How quickly a DOE contractor acts to identify and correct problems, coupled with the actual or potential safety significance of a violation, is considered when the DOE Office of Enforcement and Investigation initiates an enforcement action.

**KEYWORDS:** Price-Anderson Amendments Act, enforcement, penalties

**FUNCTIONAL AREAS:** Licensing/Compliance

## ***FINAL REPORTS***

This section of the OE Weekly Summary discusses events filed as final reports in the ORPS. These events contain new or additional lessons learned that may be of interest to personnel within the DOE complex.

### **1. MISCONFIGURED TRANSFER SWITCH AFFECTS DIESEL GENERATOR OPERATION**

On December 3, 1996, a misconfigured transfer switch at the Argonne National Laboratory—West prevented the transfer of electrical power from a diesel generator to the necessary electrical system. Test personnel could not complete a quarterly diesel generator load test because a mechanic had left the mechanical transfer arm of the transfer switch in the wrong position following annual preventive maintenance on November 9, 1996. Electricians reconfigured the transfer switch and then completed the load test on the diesel generator. This event is significant because operators did not immediately test the diesel generator after maintenance, which would have identified the problem with this vital piece of equipment. (ORPS Report CH-AA-ANLW-AL-1996-0003)

The diesel generator started as required during the load test, but the transfer from normal power to emergency power failed because the mechanical transfer arm (solenoid piston) was connected to the emergency power switch instead of the normal power switch. The solenoid piston is designed to transfer the electrical load to the emergency power switch, then transfer the electrical load from the emergency power switch to the normal power switch. Electricians isolated the transfer switch and connected the solenoid piston to the normal power switch.

Investigators determined that an inadequate procedure was both the direct and root cause of this event. The procedure the mechanic used to perform annual preventive maintenance on the affected transfer switch did not contain a provision to ensure that all parts associated with the transfer switch were in the proper alignment after all the preventive maintenance

items were performed. Also, the electrical foreman identified two training deficiencies as contributing causes, because maintenance personnel had no training or hands-on experience with a unique t-lock mechanism associated with the solenoid piston for the affected transfer switch.

Corrective actions include adding two steps to the preventive maintenance procedure. The procedure will require maintenance workers to (1) ensure the solenoid piston is in the "normal" power position and (2) perform a load test of the diesel generator after all annual preventive maintenance steps are performed to ensure everything is working properly and in alignment. Trainers will also schedule a "hands-on" training session for maintenance workers to show them how to properly engage the t-lock mechanism.

OEAF engineers also reviewed an NRC Notice of Violation this week where NRC staff proposed a \$55,000 civil penalty against a commercial utility for violations related to the operability of an emergency diesel generator at a nuclear power plant. In August 1997, an NRC resident inspector discovered the control switch for an emergency diesel generator output breaker in the wrong position. The mispositioned switch caused the diesel generator to be inoperable for at least 4 days. The emergency diesel generator provides emergency power to safety equipment if the plant loses off-site power. The Notice of Violation also cited a similar event that occurred in November 1993, for which utility management failed to take adequate corrective action to prevent recurrence.

In Weekly Summary 93-19, NFS reported a similar event at the Mound Plant where a standby diesel generator that provides backup power to tritium stack monitors was inadvertently left out-of-service. The standby generator failed to start as expected when facility personnel turned off power to a building. Facility personnel inspected the generator and discovered the control switch in the "OFF" position rather than the required "AUTO" position. Investigators determined that a mechanic left the switch in the "OFF" position after he had performed a weekly preventive maintenance check and test run on the generator 2 days earlier. (ORPS Report ALO-DA-EGGM-EGGMAT01-1993-0008)

These events illustrate the importance of performing an actual load test of diesel generators following maintenance activities to ensure everything is operational. Surveillance testing can be coordinated with preventive maintenance work or incorporated as a form of post-maintenance test to verify equipment operability. In this event, test personnel performed the annual preventive maintenance without performing the load test. Facility maintenance personnel will correct this by scheduling the quarterly load test with the annual preventive maintenance. Procedures should provide the necessary guidance for proper equipment configuration, and maintenance personnel should be trained on how unique mechanisms are assembled and function. Facility managers should also review the following guidance.

- DOE-STD-1050-93, *Guide To Good Practices for Planning, Scheduling, and Coordination of Maintenance at DOE Nuclear Facilities*, defines a post-maintenance test as any appropriate testing performed following maintenance to verify that (1) a particular piece of equipment or system performs its intended function based on its design criteria, (2) the original deficiency has been corrected, and (3) no new deficiencies are created.
- DOE-STD-1039-93, *Guide To Good Practices for Control of Equipment and System Status*, section 4.8, states that post-maintenance testing should verify

that maintenance was performed correctly and that no problems were introduced as a result of the maintenance.

- DOE/EH-0513, Safety Notice 95-04, "Post-Maintenance Test Programs," issued by NFS in December 1995 provides guidance and good practices for establishing effective post-maintenance test programs.

Safety Notice 95-04 can be obtained by contacting the ES&H Information Center, (800) 473-4375, or by writing to U.S. Department of Energy, ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874. Safety Notices are also available on the OEAF Home Page at [http://tis.eh.doe.gov:80/web/oeaf/lessons\\_learned/ons/ons.html](http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html).

**KEYWORDS:** diesel generator, switch, procedure, post-maintenance testing, training and qualifications

**FUNCTIONAL AREAS:** Electrical Maintenance, Procedures, Surveillance, Training and Qualification

## **2. WASTE PACKAGED BY MAINTENANCE EMPLOYEE WITH EXPIRED TRAINING**

On March 4, 1995, at the Rocky Flats Environmental Technology Site, a maintenance employee with expired training obtained a key to a waste drum, placed improperly packaged waste material into the drum, and re-locked the drum. Investigators determined that waste operations procedures state that waste packaging personnel must have current waste-generator qualifications and that the maintenance employee's qualifications had expired. Expired training can lead to lack of knowledge about new requirements or procedural changes and a decrease in worker proficiency that could result in an adverse impact on the environment and on personnel safety. (ORPS Report RFO--EGGR-771OPS-1995-0068)

Investigators determined that the direct cause of this event was personnel error (procedure not used or used incorrectly) because the maintenance employee did not maintain his waste-generator qualifications. They identified the root cause as a management problem (inadequate administrative control) because a formal list of qualified individuals did not exist. This meant that there was no way for the shift manager to verify whether the maintenance employee was waste-generator qualified. Additionally, there was no mechanism for key custodians to identify whether someone was waste-generator qualified. Corrective actions included the following.

- Training personnel developed and issued a list of qualified waste generators. Shift managers maintain the list in their office and use it to determine whether individuals are waste-generator qualified when making work assignments.
- Training personnel developed and maintain a list of current waste-generator qualification packages and a list of qualified personnel. They distribute these lists monthly to support personnel to assist them in ensuring that individuals assigned to specific jobs are waste-generator qualified.
- Training personnel developed waste-generator cards that show the qualification periods and issued them to qualified personnel. Key custodians can use the

cards to verify that personnel who disposition and generate waste are currently qualified.

NFS has reported training issues in several Weekly Summaries. Following are some examples.

- Weekly Summary 97-05 reported that a waste generating custodial officer at the Savannah River Site FB-Line discovered that the annual Resource Conservation and Recovery Act (RCRA) training for six waste-handling operators had expired. While conducting an internal audit of RCRA training qualifications, the officer found the operators had performed RCRA-related waste-handling activities after their annual training expired on November 30, 1996. The qualifications matrix used at the time of the event did not track the qualification expiration dates. (ORPS Report SR--WSRC-FBLINE-1997-0006)
- Weekly Summary 96-50 reported that during a review of personnel qualification/certifications manufacturing division personnel at the Pantex Plant determined that a production technician had performed work without being fully qualified. The technician had completed all required job-specific training, but lacked courses on general work practices required by plant procedures. Certification of assigned workers is part of the authorization basis. (ORPS Report ALO-AO-MHSM-PANTEX-1996-0236)

OEAF engineers searched the ORPS database for training deficiencies across the DOE complex and found 291 occurrences. Figure 2-1 shows that facility managers reported management problems as the root cause for 56 percent of the occurrences. Further review shows that they reported 35 percent of the management problems as inadequate administrative control and 26 percent as policy not adequately defined, disseminated, or enforced.

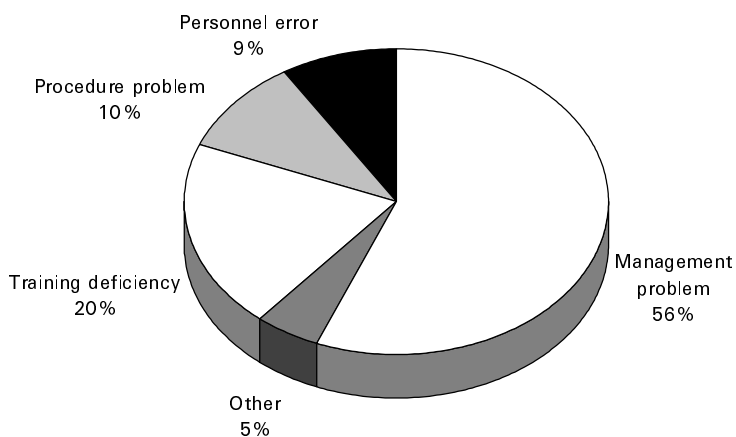


Figure 2-1. Root Causes for Training Deficiencies<sup>1</sup>

<sup>1</sup> OEAF searched the ORPS database using the graphical users interface for reports with all narrative "no training" or "expired training" and found 291 occurrences. Based on a random sampling of 20 occurrences, OEAF engineers determined that each slice is accurate to within  $\pm 1.34$  percent.

These events illustrate the need for training coordinators and facility managers to review their training program records and controls to ensure that staff are qualified and certified for the tasks to which they are assigned. Employees should also accept the responsibility for meeting qualification requirements. Record-tracking systems should be used to identify trained employees, as well as training expiration dates, so supervisors can easily track progress of entry-level and re-qualification participants.

- DOE O 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, states that the purpose of the Order is to assure that all persons are qualified to carry out their assigned responsibilities. Chapter I, sections 7.a.(1) and 7.a.(2), provide requirements for developing and maintaining training to meet the position requirements. Training department personnel also need to rigorously apply the principles and requirements of a systematic approach to training as defined in chapter I.7.b of the Order. This chapter provides a discussion of elements that contribute to a successful program for initial and continuing training. Requirements for initial and continuing training can be found in chapters I.7.c and I.7.d.
- DOE-STD-1060-93, *Guide to Good Practices for Continuing Training*, chapter 7, requires auditable records of personnel training. It also states that supervisors "should have access to qualification records, as necessary, to support the assignment of work to qualified personnel."

**KEYWORDS:** training and qualification, certification, waste handling, record keeping

**FUNCTIONAL AREAS:** Training and Qualification, Licensing/Compliance